

भारतीय मानक

IS 11582 : 2023

Indian Standard

स्कोविल यूनिट्स द्वारा अदरक के तीखेपन
के संवेदी मूल्यांकन के लिए विधि

(पहला पुनरीक्षण)

**Method for Sensory Evaluation of
Pungency of Ginger by Scoville
Units**

(*First Revision*)

ICS 67.220.10

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भारतीय मानक ब्यूरो

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November 2023

Price Group 5

FOREWORD

This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Spices and Condiments Sectional Committee had been approved by the Food and Agriculture Division Council.

Pungency is important sensory characteristic in ginger in addition to aroma. Its evaluation is important especially as pungency varies greatly with storage period and form in which the ginger is stored as whole, powder or oleoresin. Pungency is elicited by gingerol, the (6)-homologue of the phenyl and alkyl-3-one and its dehydration product shogaol. Chemical estimation of both gingerols and shogaol is important while estimating the pungency of ginger as shogaol is proved to be twice as pungent as gingerol. Scoville units of total ginger oleoresin or extract of powder (5 percent moisture) will give an estimate of both the pungent compounds. The sensory methods of analysis given in this standard may be used for academic and research purposes as appropriate.

The standard was originally published in 1986 and considerable assistance was derived from the research investigations carried out at Central Food Technological Research Institute (CFTRI), Mysuru. In this revision, information on new advanced methods for determination of active compounds in spices has been included and the standard has been brought out in the latest style and format of Indian Standard.

The composition of the Committee responsible for formulation of this standard is given in [Annex C](#).

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 2022 ‘Rules for rounding off numerical values (*second revision*)’. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

METHOD FOR SENSORY EVALUATION OF PUNGENCY OF GINGER BY SCOVILLE UNITS

(*First Revision*)

1 SCOPE

1.1 This standard prescribed a method for sensory evaluation of pungency in ginger by Scoville units (SU) corresponding to the recognition threshold.

1.2 This procedure is applicable to ginger whole (fresh and dry rhizomes) or powder or oleoresin. The tables are interchangeable.

NOTE — Other method available for determination main pungent components gingerols and shogaols in ginger whole or oleoresins is given in [IS 16357](#).

2 REFERENCES

The standards given below contain provisions which, through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of these standards:

<i>IS No.</i>	<i>Title</i>
IS 1070 : 2023	Reagent grade water — Specification (fourth revision)
IS 6273	Guide for sensory evaluation of foods:
(Part 1) : 1971	Optimum requirements
(Part 2) : 1971	Methods and evaluation cards
IS 8104 : 1996/ ISO 3513 : 1995	Chillies — Determination of scoville index (first revision)
IS 8105 : 1976	Method for sensory evaluation of pungency of black pepper by scoville heat units
IS 16357 : 2017/ ISO 13685 : 1997	Ginger and its oleoresins — Determination of the main pungent components gingerols and shogaols — Method using high-performance liquid chromatography

3 TERMINOLOGY

3.1 For the purpose of this standard, the following definition shall apply.

3.2 Scoville Unit — Reciprocal of the lowest concentration of the stimulus at which pungency is recognized by a defined panel.

4 OPTIMUM REQUIREMENT

4.1 Optimum requirements for sensory evaluation of pungency of ginger shall be as described in [IS 6273 \(Part 1\)](#).

4.2 The test shall be carried out with the same care as in threshold tests of [IS 6273 \(Part 2\)](#).

5 PRINCIPLE

5.1 Determining pungency in test sample through threshold tests using ascending concentration series as described for chilies and expressing the Scoville units in accordance with [IS 8104](#).

5.2 Evaluation with pure natural capsaicin or piperine for the purpose of selection of homogeneous panel and definition of the panel sensitivity.

6 REAGENTS

6.1 Unless specified otherwise, pure chemicals and distilled water (see [IS 1070](#)) shall be employed.

6.2 Ethanol — 95 percent

6.3 Sugar Solution — 3 percent solution of sucrose in water.

6.4 Glycerol monostearate at levels of 10 ppm to be used in case of stored, old samples of oleoresin.

To access Indian Standards click on the link below:

https://www.services.bis.gov.in/php/BIS_2.0/bisconnect/knowyourstandards/Indian_standards/isdetails/

7 APPARATUS

7.1 Round Bottom Flask with Reflux Condenser — 200 ml capacity

7.2 Volumetric Flask — 100 ml

7.3 Pipettes — 1 ml capacity, graduated in 0.01 ml; 5 ml and 10 ml capacity, graduated in 0.1 ml.

7.4 Analytical Balance

7.5 Beakers — 25 ml capacity with 5 ml marking.

8 PROCEDURE

8.1 Preparation of Stock Solution

8.1.1 Whole Ginger Rhizome/Powder

The moisture has to be reduced to 10 percent after making slices and powdered to pass through 710 μm IS sieve.

8.1.1.2 Dilute 50 ml of aliquot of (see [8.1.1](#)) to 250 ml with 3 percent sugar solution. This stock solution corresponds to a dilution of 1 : 500 (see [Annex B](#)).

8.1.2 Ginger Oleoresin

Dissolve 0.2 g of oleoresin in 100 ml ethanol. The stock solution corresponds to a dilution of 1 : 500 (see [Annex B](#)).

8.2 Instructions for Sensory Testing for Pungency

8.2.1 Scoville tests are carried out as threshold tests as prescribed in [4.3.1](#) of [IS 6273 \(Part 2\)](#).

8.2.2 Make 4 ml to 5 ml dilutions (5 ml each) of test solution in sequential order from highest dilution below. Use varying number of blanks at the beginning of the series. All the samples are to be coded.

8.2.3 Ginger aroma is likely to appear especially while testing fresh samples earlier than pungency threshold. Panel should avoid bias due to this factor.

8.2.4 Allow sufficient time lag (10 s to 20 s) between samples. Clear palate well in between samples with

warm water or puffed rice.

8.2.5 Use the score card given in [Annex A](#). Pungency in ginger is felt sharply but vanishes quickly unlike in capsicum or pepper.

8.2.6 Testing should be stopped when a definite pungency is felt using geometric series as the next sample may have high pungency.

8.3 Preliminary Testing

8.3.1 The panel leader shall test the samples preliminarily with a large common ratio (1 : 5) in making dilution to, avoid waste of time by giving too dilute or too strong solutions to the panelists.

8.3.2 After identifying the approximate threshold of sample, prepare dilutions with strength in geometric progression with a closer common ratio (1 : 1.2) for preliminary testing by the panel. For example, if the panel leader identifies pungency around 25×10^2 SU in ginger powder and 200×10^2 SU in ginger oleoresin, which correspond to dilution as defined in [3.1](#), the following series can be used for preliminary panel testing:

Place the indicated volume of stock solution (see [Annex B](#)) in 100 ml volumetric flask and make up to volume with 3 percent sugar solution as given in [Table 1](#).

8.3.3 Test these series in two sets with a group of (10 to 15) panelists. Use the sessions to identify a fairly homogeneous group of sensitivity. Test sensitivity with pure natural piperine and define sensitivity. The dilution shall be in accordance with [IS 8105](#).

8.4 Final Evaluations

8.4.1 Prepare dilutions from stock solutions in an ascending arithmetic series of concentration around the approximate threshold identified in [8.3.3](#). The series should differ in concentration by approximately one JND (just noticeable difference) (which is around 0 to 15 of the threshold value in ginger as identified by experimentation). This series should be prepared by referring to [Annex B](#). For example, for samples with approximate threshold of 20×10^2 SU for ginger powder and 170×10^2 SU for ginger oleoresin, which correspond to dilutions as defined in [3.1](#), the series given in [Table 2](#) shall apply:

Table 1 Dilution series for stock solution in preliminary testing

(Clause 8.3.2)

Sl No.	Ginger Powder			Ginger Oleoresin	
	Stock Solution ml (see 8.1.1)	SU × 10 ²	Stock Solution ml (see 8.1.2)	SU × 10 ²	
(1)	(2)	(3)	(4)	(5)	
i)	14.0	36	1.72	290	
ii)	16.7	30	2.08	240	
iii)	20.0	25	2.50	200	
iv)	23.8	21	3.00	167	
v)	27.8	18	3.40	138	

Table 2 Dilution series for stock solution in final evaluation

(Clause 8.4.1)

Sl No.	Ginger Powder			Ginger Oleoresin	
	Stock Solution ml (see 8.1.1)	SU × 10 ²	Stock Solution ml (see 8.1.2)	SU × 10 ²	
(1)	(2)	(3)	(4)	(5)	
i)	19.2	26	2.27	220	
ii)	21.7	23	2.63	190	
iii)	25.0	20	2.94	170	
iv)	29.4	17	3.44	145	
v)	35.7	14	4.00	125	

8.4.2 Final tests shall be conducted as threshold test with a homogeneous sensitivity group of a minimum of 5 panelists. 3 to 4 repeated tests are done to get 15 to 20 judgements taking care that dilution series are different at each session to avoid positional bias.

9 PRESENTATION OF DATA

9.1 Decode the test series in terms of Scoville units.

9.2 For threshold value of sample, the Scoville unit corresponding to X in the score card is recorded. When intermediate scale values are given as X and X-1 for successive samples, the mean of Scoville values of these dilutions are considered as threshold value.

9.3 As threshold values recorded may show, sudden day-to-day variations, periodical check of panelist's sensitivity should be made and values widely differing from normal should be deleted.

9.4 Scoville value is calculated as the arithmetic mean of each panel and in repetition. After screening the data to remove values which are lower or higher than one JND (just noticeable difference), approximately (0 to 15) of group average, the mean is calculated to give the Scoville value of the sample.

9.5 Express the pungency threshold of sample as mean Scoville unit with one standard deviation since sensitivity value cannot be an absolute value.

10 TEST REPORT

10.1 The pungency of sample in Scoville Unit (SU) should be reported as mean threshold \pm 10 based on all panelists (see 9.2) in hundreds (that is, $\times 10^2$).

10.2 The test report should contain the definition of panel sensitivity as per 8.3.3 to enable comparison of data obtained by using another panel.

ANNEX A

(Clause 8.2.5)

SCORE CARD FOR THRESHOLD TEST FOR PUNGENCY IN GINGER

Name _____ Date _____ Time _____

INSTRUCTIONS

Taste the samples in the following sequential order.

Swallow slowly the whole quantity of the test sample.

Wait for few seconds to recognize pungency, if any (aroma suggesting the spice should not be confused for pungency).

Take some puffed rice and few sips of sugar solution between samples.

Describe the sensation of each sample using the intensity scale given below:

None or sugar solution	0
Different from sugar solution (but pungency non-identifiable)	? stimulus threshold
Threshold (pungency identifiable)	X recognition threshold
Weak pungency	1
Medium pungency	2
Strong pungency	3
(Intermediate values should be expressed as ?-X, X-1, 1-2, etc)	

Series I		Series II	
Code No.	Score for Intensity	Code No.	Score for Intensity

ANNEX B

(Clauses 8.1.1.2, 8.1.2, 8.3.2 and 8.4.1)

ARITHMETIC SERIES OF DILUTION FOR GINGER

B-1 Place the indicated volume of stock solution (8.1.1, 8.1.2, SU 500) in 100 ml volumetric flask and make up to volume with 3 percent sucrose solution to obtain corresponding Scoville units.

Sl No.	Oleoresin		Powder	
	Stock Solution ml (see <u>8.1.2</u>)	SU × 10 ²	Stock Solution ml (see <u>8.1.1</u>)	SU × 10 ²
(1)	(2)	(3)	(4)	(5)
i)	1.25	400	16.7	30
ii)	1.35	370	17.2	29
iii)	1.47	340	17.9	28
iv)	1.61	310	18.5	27
v)	1.79	280	19.2	26
vi)	1.92	260	20.0	25
vii)	2.00	250	20.8	24
viii)	2.08	240	21.7	23
ix)	2.17	230	22.7	22
x)	2.27	220	23.8	21
xi)	2.38	210	25.0	20
xii)	2.50	200	26.3	19
xiii)	2.63	190	27.8	18
xiv)	2.78	180	29.4	17
xv)	2.94	170	31.2	16
xvi)	3.12	160	33.3	15
xvii)	3.33	150	35.7	14

The dilution of required SU may be calculated as follows:

$$\text{Stock solution } (\underline{8.1.2} \text{ or } \underline{8.1.1}) \text{ to be made up to } 100 \text{ ml} = \frac{\text{SU of stock solution}}{\text{SU required}} \times 100$$

ANNEX C

(Foreword)

COMMITTEE COMPOSITION

Spices and Condiments Sectional Committee, FAD 09

<i>Organization</i>	<i>Representative(s)</i>
Spices Board India, Kochi	DR A. B. REMA SHREE (Chairperson)
All India Spices Exporters Forum, Kochi	SHRI CHERIAN XAVIER MS PRIYAMVADA NILAYANGOD (<i>Alternate</i>)
Confederation of Indian Industry, New Delhi	Ms NEHA AGGARWAL SHRI KANNAN B. (<i>Alternate</i>)
Consumer Coordination Council, Noida	SHRI RAMJI BHAI MAVANI
CSIR - Central Food Technological Research Institute, Mysuru	DR M. MADHAVA NAIDU SHRI NAGARAJAN S. (<i>Alternate</i>)
CSIR - National Institute for Interdisciplinary Science and Technology, Thiruvananthapuram	DR RAGHU K. G.
Defence Food Research Laboratory, Mysuru	DR K. R. ANILA KUMAR SHRI DEV KUMAR YADAV (<i>Alternate</i>)
Directorate of Arecanut and Spices Development, Calicut	DR HOMEY CHERIYAN DR FEMINA (<i>Alternate</i>)
Directorate of Marketing and Inspection, Faridabad	SHRI SHIVNANDAN SHRI RAHUL SINGH (<i>Alternate</i>)
Export Inspection Council of India, New Delhi	SHRI WASI ASGHAR SHRI SHASHI PRAKASH TRIPATHI (<i>Alternate</i>)
Food Safety and Standards Authority of India, New Delhi	ADVISOR
ICAR - Indian Institute of Spices Research, Kozhikode	DR N. K. LEELA DR E. JAYASHREE (<i>Alternate</i>)
ICMR - National Institute of Nutrition, Hyderabad	DR S. SREENIVASA REDDY DR PARAS SHARMA (<i>Alternate</i>)
Kerala Agricultural University, Thrissur	DR SAJI GOMEZ DR SEEJA THOMACHAN PANJIKKARAN (<i>Alternate</i>)
National Institute of Food Technology Entrepreneurship and Management, Sonipat	DR SUNIL PAREEK
National Research Centre on Seed Spices, Ajmer	DR S. N. SAXENA DR B. K. MISHRA (<i>Alternate</i>)
Praveen Masalewale, Pune	SHRI ANAND CHORDIA MS ROHINI KULKARNI (<i>Alternate</i>)

<i>Organization</i>	<i>Representative(s)</i>
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World Spice Organization, Kochi	SHRI RAMKUMAR MENON SHRI PHILIP KURUVILLA (<i>Alternate</i>)
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Member Secretary
SHRIMATI NAVITA YADAV
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This Indian Standard has been developed from Doc No.: FAD 09 (21943).

Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

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